

## Inhaled Lavender Effect on Anxiety and Pain Caused From Intrauterine Device Insertion

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### ABSTRACT

**Introduction:** Intrauterine device (IUD) is the most common reliable, effective and reversible contraceptive method used worldwide and in areas with high growth rate is of particular importance. IUD insertion is associated with high anxiety in most people that causes pain and discomfort. The aim of this study was to determine the effects of aromatherapy on anxiety and pain caused by IUD insertion. **Methods:** This study was conducted on 106 women in a health care center located in Ardebil, Iran. Participants were divided into two groups by randomized blocks of 4 and 6. In the experimental group lavender scent was inhaled and in the control group the placebo was inhaled 30 minutes before IUD insertion. The anxiety of the participants was measured by Spielberger questionnaire, and the pain of IUD insertion was measured immediately after the insertion using visual analog scale (range 0-10). **Results:** The mean score (standard deviation) of anxiety before intervention was 43.2 (9.2) in the experimental group that decreased after intervention to 39.0 (10.5) ( $p < 0.001$ ), while this score was 42.2 (9.0) and 41.5 (8.4) before and after the intervention in the control group ( $p = 0.21$ ). Mean differences of anxiety in both groups was statistically significant ( $p < 0.001$ ). The pain score after intervention did not show significant difference between two groups ( $p = 0.51$ ). **Conclusion:** Aromatherapy with lavender inhalation was effective in decreasing anxiety in IUD procedure, and this method can be used in health care centers as complementary treatments.

## Introduction

Among the contraceptive methods, intrauterine device (IUD) is the most common, reliable and reversible methods used worldwide that is effective for 10 to 12 years and in areas with high growth rate is of particular importance.<sup>1</sup> During 10 years of usage, two pregnancies out of 100 women occur that in case of effectiveness is similar to tubal ligation (TL).<sup>2</sup>

IUD insertion procedure is experienced by 6 million women in the world every year. It can cause pain and discomfort by using tenaculum to hold the cervix and straightening

the uterus for the proper placement of the IUD, activities within the cervix (such as measuring the depth of the uterus, placing the IUD insertion tube, removing the tube and locating the device in the uterus).<sup>3</sup>

IUD insertion is associated with high anxiety in most of the people and anxiety and fear can cause pain and discomfort during IUD insertion.<sup>4,5</sup> Stress and anxiety cause muscle contraction and results in the increase of pain. This pain also increases the patient's stress and anxiety, because patterns of autonomic pain and anxiety are similar to each other. Stressful environments like hospitals and health care centers might

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increase patient's stress which in turn decreases her tolerance to pain.<sup>6</sup> Different factors such as cultural, psychological and anxiety can also influence on the perception of pain.<sup>7</sup> Pain caused from IUD insertion and the fear from it could make women unwilling to use this method<sup>8,9</sup> and instead of using IUD they might request early sterilization or use less effective and inappropriate methods that puts them at the risk of unwanted pregnancy.<sup>9</sup>

To minimize the risk and discomfort of IUD insertion different treatment methods has been used including non-steroidal anti-inflammatory and anti-anxiety medication.<sup>10,11</sup> Since most of the medications used to control anxiety and pain have different side effects and are expensive, most of the non-pharmacological methods which are currently used are in the category of complementary treatments. Aromatherapy is one the treatments among the other complementary treatments in regard to anxiety which is developing in most of the countries.<sup>12</sup> Aromatherapy or fragrance treatment is known as the therapeutic purposes with the use of essential oils or aromas extracted from aromatic plants.<sup>13</sup>

The use of oils of aromatic plants for treating different illnesses was benefited from thousands years of history in Egypt and India.<sup>14</sup> Today, the U.S. State Board of Nursing introduced this treatment as a part of holistic nursing.<sup>14, 15</sup> In England, this kind of treatment is accepted in nursing practice.<sup>16</sup> It is based on this general rule that the sense of smell has an important part in the general health and physical and mental relaxation of the human body. The human brain has an emotional response to every fragrance, thus when a scent is inhaled, its molecules are transported via the olfactory system to the limbic system, and this area is closely related to other systems that control memory, excitement and hormones, and causes the release of different neurotransmitters such as encephalin, endorphins, noradrenaline and

serotonin which ultimately results in decrease in anxiety.<sup>17</sup>

One of the essential oils that are widely used in aromatherapy is the oil extracted from lavender. Lavender is one of the plants that have been used in traditional medicine. It belongs to mint family,<sup>17</sup> it is an herbaceous plant and ever green, has antianxiety effect as well as sedative, antibacterial, antifungal, anti-flatulence, antispasmodic, anti-inflammatory and antihistamine properties. It also aids in overcoming sleep disorders.<sup>17</sup> The results from Mirzaei study showed that inhaling lavender scent results in decrease in anxiety during laboring, decrease secretion of cortisol from the adrenal gland and increase in secretion of serotonin from the gastrointestinal tract.<sup>18</sup> Molaenagad study results showed that aromatherapy reduces anxiety, stress and laboring pain.<sup>19</sup> Saeki and Mayumi study confirmed these results and revealed that aromatherapy could induce relaxation in people.<sup>20</sup> Lehner et al. also showed in their study that lavender inhalation could reduce the anxiety in patients before dental procedure.<sup>21</sup> Khazaei showed the same results in his study.<sup>22</sup>

Anxiety and fear are one of the barriers in choosing diagnostic and therapeutic methods in hospitals and health care centers. Some of the family planning clients do not choose this reliable and effective method due to their fear from IUD insertion, or even if they choose it, they will feel pain and stress during its procedure. Public health aims to increase the number of women using IUD. The role of midwifery in family planning and population control is of great importance. Since promoting the quality of family planning and protection are of primary principals of midwifery, this study aimed to determine the effects of lavender scent on anxiety and pain caused by IUD insertion.

## Materials and methods

This study was a randomized controlled

clinical trial to determine the impact of inhaled lavender on anxiety and pain caused by IUD insertion. The target population was married women in their reproductive age (15-49 years old) attending to Bamonar Health Care Center in Ardebil, Iran in 2011. The reason for choosing this health care center was the high rate of IUD insertion that was approximately 30 cases each month.

To determine the sample size Stata software version 9.2 was used. Number of samples was calculated according to findings of a survey<sup>22</sup> which was 53 people for each group. The eligibility criteria were: no contraindications for IUD insertion, no history of cervical surgery, gaining a score of higher than 30 in the 20 questions of Spielberger questionnaire, understanding the consent, having no severe pain while completing the questionnaire, no use of benzodiazepines, tranquilizers, narcotics or analgesics, not having eczema or its past history, not having asthma, allergy, migraines or chronic headaches according to the participant report, no active mental diseases, not having impaired sense of smell based on participant report.

After obtaining permission from the Research Ethic Committee of Tabriz University of Medical Sciences (code: 9029), subjects referring to the health care center who had the inclusion criteria were given the descriptions about the aims and methods of the study. At first, their level of anxiety was measured by Spielberger questionnaire and if their score was more than 30 they were chosen as the study subject. After providing written consent, they completed the form for demographical characteristics and their pulse and blood pressure was measured.

The random allocation of the individuals in the groups was performed by computerized table of random numbers through randomized blocks of four and six. The participants were randomly placed in the two groups of lavender scent and placebo (diluted milk). The person in charge of the IUD insertion and the person who measured the anxiety and pain were not aware of the

allocation. The participants were also informed about the random group selection and that even the researcher did not know who would be assigned to which group. Sealed bottles were handed to the participants with numbers from 1 to 106. The glasses contained 10 drops of lavender with diluted milk. It was asked from the participants to inhale three drops of the solution on cotton for 30 minutes and to add more drops if required.<sup>23</sup> The reason for using cotton in this study was to prevent the scent from releasing in the room. After 30 minutes of inhaling, the researcher completed Spielberger anxiety questionnaire and controlled their pulse and blood pressure. Then the IUD insertion was started and during the procedure subjects continued inhaling the cotton containing solution. Immediately after IUD insertion, the level of felt pain was measured by visual analog scale. Note that all the IUD insertions were performed during menstrual period. It should be mentioned that there was no side effects from inhaling lavender and none of the subjects were excluded from the study.

Data gathering tools consisted of two parts. First part contained personal information (age, education and occupation) and their delivery background (number of deliveries, number of natural delivery, cesarean, abortion, curettage, the interval between IUD insertion until the last delivery, breastfeeding, history of IUD insertion, time of removing the previous IUD, reason for removing the previous IUD, history of cautery and cryotherapy and surgery related to female genitalia). The second part of the tools had three subsections; first section was related to Spielberger anxiety questionnaire, second section recorded the vital signs and the third section consisted of visual analog scale for pain (VAS). It was explained to the participants that the 0 on VAS means no pain and 10 indicates that the pain is very severe. Anxiety questionnaire contained two parts of overt and covert anxiety and comprised of four questions, that in this study only the

overt and concurrent anxiety was evaluated. Anxiety had 20 questions and was classified with four items (not at all, somewhat, medium and too high) with scores from 20 to 80 (20 = without anxiety, 21-39 = mild anxiety, 40-59 = medium anxiety, 60-79 = high anxiety, 80 = severe anxiety). Spielberger questionnaire is a valid and creditable tool. Its reliability was assessed in many different researches conducted in Iran such as in Karimi's study<sup>24</sup> that it was checked by Cronbach's alpha ( $\alpha = 90\%$ ).

For data analysis SPSS software version 13 was used. If the distribution was normal independence t-test and paired t-test was used, and if the distribution was not normal Mann-Whitney U test and Wilcoxon was used. P-value < 0.05 was considered statistically significant.

## Results

The groups did not have significant difference and were similar in terms of demographical

characteristics and pregnancy. The age range of the people in the study was from 16 to 40 years old. The majority of the samples in both groups were in the age group of 30 to 35 years old. The level of education in both groups was mostly diploma and higher degree, also most of their occupation was housewife and the statistical test did not show any significant difference among the two groups ( $p > 0.05$ ). Most of the participants did not have a history of abortion and curettage. More than 12 months had passed from their last delivery for most of them (58%) in both groups (Table 1).

The mean score of anxiety in experimental group was  $43.2 \pm 9.2$  before intervention that significantly decreased to  $39.0 \pm 10.5$  after intervention ( $p < 0.001$ ,  $t = -4.77$ ,  $df = 52$ ). Mean score of control group before intervention was  $42.2 \pm 9.0$  and reached  $41.5 \pm 8.4$  after the intervention ( $p < 0.21$ ,  $t = -1.28$ ,  $df = 52$ ). Mean difference score of anxiety in the experimental group was  $-4.19 \pm 6.3$  and in control group it was  $-0.74 \pm 4.18$  and the difference was significant ( $p < 0.001$ ,  $df = 89.69$ ,  $t = 3.29$ ) (Table 2).

**Table 1.** Demographical characteristics

	Experimental group N = 53	Control group N = 53	P
Age (years)*	28 (5.4)	28 (6.24)	0.54
Number of pregnancy*	1.7 (0.79)	1.64 (0.76)	0.61
Interval between current IUD insertion until the last delivery (month)*	35.2 (34.5)	40.1 (50.1)	0.60
Number of natural delivery*	1 (0.98)	1.28 (0.83)	0.81
History of curettage**	0	2 (3.7)	0.41
History of breastfeeding**	28 (41.5)	21 (39.6)	0.17
History of IUD insertion**	22 (41.5)	18 (34)	0.42
History of caesarian**	25 (47)	28 (52.8)	0.56
History of abortion**	8 (15.1)	10 (18.9)	0.15

\* Mean (SD); \*\* Number (%).

**Table 2.** Mean score of anxiety before and after intervention

	Experimental group* N = 53	95% CI	Control group* N = 53	95% CI	P
Mean score of anxiety before intervention	43.22 (9.28)	40.67 - 45.79	42.24 (9.08)	39.75 - 44.75	0.21
Mean score of anxiety after intervention	39.03 (10.55)	36.13 - 41.95	41.50 (8.42)	39.19 - 43.8	0.001
Mean difference score of anxiety	-4.19 (6.39)	-5.95 - 2.43	-0.74 (4.18)	-1.89 - 41.87	0.001

\* Mean (SD); CI: Confidence interval

**Table 3.** Mean difference of vital signs in both groups

	Experimental group	Control group	P
Mean difference of systolic blood pressure*	-1.98 (4.31)	0.00 (3.92)	0.03
Mean rank	47.42	59.53	
Mean difference of diastolic blood pressure*	-2.67 (5.63)	-0.19 (6.04)	0.03
Mean rank	47.34	59.66	
Mean difference of pulse*	-0.25 (3.98)	1.24 (3.78)	0.06
Mean rank	48.04	58.96	

\* Mean (SD).

**Table 4.** Subjects distribution according to level of pain in both groups after intervention

Level of pain	Experimental group (%)	Control group (%)
No pain felt	16 (30.2)	14 (26.4)
Mild (1 - 3)	28 (52.8)	27 (50.9)
Medium (4 - 7)	8 (15.1)	11 (20.8)
Severe (8 - 10)	1 (1.9)	1 (1.9)
Median (IQR)	1 (0 - 3)	1 (0 - 3)
Mean rank	47.42	59.53

IQR: Interquartile range(25,75)

The heart rate difference (before and after intervention) in both groups was not significant, but the difference in systolic and diastolic blood pressure (before and after intervention) in both groups was significant (Table 3). Level of pain after intervention in both groups did not show any significant difference ( $p < 0.51$ ). After categorizing the level of pain, in both groups the highest frequency was in the level of mild pain (52.8% experimental group, 50.9% control group) (Table 4).

## Discussion

The results of the study showed that aromatherapy considerably reduce anxiety of IUD insertion. The study by Khazaei<sup>22</sup> showed that mean score of anxiety in experimental group before intervention was  $43.7 \pm 15.5$  and after intervention was  $29.3 \pm 9.8$ , while in the control group it was  $47.1 \pm 14.4$  before intervention and  $40.8 \pm 13.30$  after intervention, and there was a significant difference among both groups ( $p < 0.001$ ) that is consistent with the present study. Kutlu et al.<sup>25</sup> evaluated the effect of

lavender scent on the anxiety of nursing students during final exams and reached the conclusion that lavender scent causes significant decrease in the anxiety level of the intervention group. Muzzarilli et al.<sup>26</sup> showed that aromatherapy by lavender is not effective in reducing patients anxiety ( $p = 0.63$ ) that is not in consistent with the findings of the present study. This difference might be due to the used dosage in Muzzarilli et al. study. They used 10% lavender essence that was dissolved in grape seed oil but in the present study the essential oil was used pure. Another reason might be the duration of inhaling, which in Muzzarilli et al. study it was for 5 minutes. Lehner et al.<sup>21</sup> showed that aromatherapy with lavender could decrease anxiety for patients before dental procedure ( $p = 0.039$ ) and was in consistent with the present study.

The exact mechanism of how aromatherapy reduces anxiety is not yet specified. The scientific theory is that aromatherapy is effective by two means of psychological and physiological effect. It is believed that the scent from aromas activates olfactory nerve cells, which result in limbic system stimulation. Depending on the kind of aromas the nerve cells release different neurotransmitters. These neurotransmitters include enkephalin, endorphin, noradrenaline and serotonin. On the other hand, with regards to the relation among sense of smell with human emotion and feelings, the aromas could impact both human mind and body. In fact, smells can change human's feelings.<sup>27</sup> Valid evidence show that aromatherapy

affects anxiety, physiological conditions and people's behavior.<sup>28</sup> Daghighbin<sup>29</sup> expressed the characteristics of components of lavender aroma in which vinyl linalool acetate has also narcotic attributes, and the vinyl operates as a sedative. However, the exact mechanism of neurological function of lavender is not clear. Graham *et al.*<sup>30</sup> showed that aromatherapy inhalation was not effective on cancer patients under radiation, instead, the anxiety in the control group was lower than the aromatherapy group. Researchers believe that this increased anxiety was due to the special smell and the stressful experience of radiation.

The present study showed that aromatherapy inhalation caused reduction in systolic and diastolic blood pressure of the participants. Hwang study,<sup>31</sup> entitled "the effects of essential oils inhalation on blood pressure and response to stress", showed that aromatherapy is an effective intervention in reducing blood pressure ( $p < 0.05$ ). In a study conducted by Saeki and Mayumi<sup>20</sup> in determining the effects of aromatherapy by lavender on nursing students revealed that lavender increases parasympathetic activity and decreases sympathetic activity and therefore it reduces the blood pressure which is consistent with the present results. Shiina *et al.*<sup>32</sup> showed that aromatherapy does not have an effect on blood pressure and is inconsistent with the present study results. This difference might be due to the difference of dosage used in the study. In Shiina *et al.* study<sup>32</sup> four drops of lavender was mixed with 20 milliliters of water, whereas in this study the lavender was used without dilution.

The results of the present study revealed that aromatherapy does not have an effect on the pain caused from IUD insertion. No study was found in this regard. A study by Kane *et al.*<sup>33</sup> showed that intervention with lavender essence could cause significant decrease of pain during changing wound bandage and after it ( $p < 0.05$ ). It is difficult to assess pain as a sign, since pain is a mental feeling and a combination of sensory, emotional and cognitive components. Pain tolerance is

profoundly influenced by culture. Ethnic cultural differences among the study population influences perception and pain tolerance.<sup>7</sup>

According to the latest Ministry of Health's duties, midwives are allowed to use traditional medicine and alternative medicine drugs. The results of this study showed the positive effect of aromatherapy on reducing anxiety caused by IUD insertion. Therefore, aromatherapy is recommended as a new and easy option for midwifery in order to reduce anxiety for eligible individuals. However, more studies are needed to be done on the safety and the quality of pure oils. The limitations of this study were the influence of cultural and economic factors and the history of IUD insertion on anxiety and pain. These limitations were controlled by random selection.

## Ethical issues

None to be declared.

## Conflict of interest

The authors declare no conflict of interest in this study.

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